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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/819,613	03/29/2001	Yasuo Okutani	862.C2178	4198

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EXAMINER

NOLAN, DANIEL A

ART UNIT

PAPER NUMBER

2654

DATE MAILED: 10/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/819,613

Applicant(s)

OKUTANI ET AL.

Examiner

Daniel A. Nolan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,6-10 and 13-23 is/are rejected.
- 7) ☒ Claim(s) 4,5,11 and 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Because the language of certain claims is written in the manner prescribed to determine the equivalents of the element, as required by 35 U.S.C. 112, 6th paragraph, but the specification does not include listing the where indicated, the Examiner is proceeding with the understanding that such claims are not intended to be examined as "plus function" claims and that the term "means" indicates "process". See MPEP §2111.01 [R-1] & §2181–§2186 that reads, in part: "*... the specification must be consulted to determine the structure, material, or acts corresponding to the function recited in the claim.*"

(Note that this application has been included in **Art Unit 2654**, and that this AU number should be used in all future correspondence.)

Information Disclosure Statement

2. The information disclosure statements filed 15 June, 09 May and 29 March, 2001 fail to comply with 37 CFR 1.98(a)(1) and (b), which require a list of all patents, publications, or other information submitted for consideration by the Office.

- Applications 09/037,998, 09/263,262, 09/264,866, 09/262,852 are appended to the form PTO-892 accompanying this action and have been considered.
- Application 09/301,669 was not received and is not included in the 892 as the information referred to therein has not been considered. See MPEP § 609 A(1).

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

- In figure 7, "S602" is not specified.
- A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

- The term "*upper liklihoods*" found in claims 6 and 13 (lines 23 & 1, respectively) is not explained in the specification.
- The Examiner is proceeding with the understanding that the term is not of significance being employed in conjunction with another limit on the same feature that was defined.

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5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested:

"Speech signal segment recognition dictionary construction and maintenance".

Claim Objections

6. Claim 17 is objected to because of the following informalities:

- "Learning" is misspelled (2nd line claim 17).

Appropriate correction is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which that subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

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under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Maddox & Komori et al^{'975 & '396}

9. Claims 1, 6, 8, 13, 15, 17, 18, 20, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox (U.S. Patent 6,000,024 A) in view of Komori et al^{'975} (U.S. Patent 5,812,975) and further in view of Komori et al^{'396} (U.S. Patent 5,787,396).

10. Regarding claims 1 and 8, the invention for a parallel computing system by Maddox reads on the feature of the claim for *a speech signal processing apparatus* as follows:

- Maddox (column 6 lines 44-46) reads on the feature of *a speech segment search means for searching a speech database for speech segments that satisfy a phonetic environment*;
- Maddox does not mention HMM. The state transition model design and voice recognition of Komori et al^{'975} (column 3 lines 32-38) reads on the feature of *HMM learning means for computing HMMs of phonemes on the basis of a search result of that speech segment search means* and (column 6 lines 52-53) reads on the feature of *segment recognition means for performing segment recognition of the speech segments on the basis of the HMMs of the phonemes*;

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- Maddox does not mention registering segments. The speech recognition method of Komori et al³⁹⁶ (column 4 lines 24-30) reads on the feature of *registration segment determination means for determining a speech segment to be registered in a segment dictionary in accordance with a segment recognition result of that segment recognition means*.
- It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Komori et al to the device/method of Maddox so that differences in phone environments – such as preceding and succeeding phones – can be classified finely.

11. Regarding claims 6 and 13 as understood by the Examiner; the claims are set forth with the same limits as claims 1 and 8, respectively. Maddox does not mention registering segments. Komori et al³⁹⁶ (2032 in figure 8) reads on the feature of *speech segments having ikelihoods not less than a predetermined value registered in the segment dictionary* which would have made it obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method and/or teachings of Komori et al³⁹⁶ to the device/method of Maddox so as to have recognition results reflect an acceptable comparison.

12. Regarding claim 15, the claim is set forth with the same limits as claim 8. Maddox (claim 7 line 32) reads on the feature of *a computer readable storage medium storing a program for implementing a method cited*.

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13. Regarding claims 17 and 20, the features of the claims are the same as those found in claims 1 and 8 and the claims are rejected for the same reasons.

14. Regarding claims 18 and 21; the claims are set forth with the same limits as claims 17 and 20, respectively. Maddox is silent as to use of HMM. Komori et al³⁹⁶ (column 4 lines 15-31) reads on the feature that *obtains a maximum likelihood HMM which has a maximum likelihood with one of the plurality of speech segments from the HMMs corresponding to the phonemes, checks if the one speech segment is a speech segment used in learning of the maximum likelihood HMM, and selects the one speech segment when the one speech segment is a speech segment used in learning of the maximum likelihood HMM*. It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method and/or teachings of Komori et al to the device/method of Maddox so as to process faster without reducing recognition accuracy.

15. Regarding claim 23, the claim is set forth with the same limits as claim 20. Maddox (claim 7 line 32) reads on the feature of *a computer readable storage medium storing a program for implementing a method cited*.

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Maddox, Komori et al^{'975 & '396}, & Rosenberg

16. Claims 2 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori et al^{'975} and further in view of Komori et al^{'396} and further in view of Rosenberg ("Connected Sentence Recognition Using Diphone-Like Templates" International Conference on Acoustics, Speech, and Signal Processing, April 1988).

17. Regarding claims 2 and 9; the claims are set forth with the same limits as claims 1 and 8, respectively. Maddox is silent on the feature of diphones or biphones. Rosenberg (lines 7-9 left column page 473) reads on the feature that *segment recognition means adopts diphones as units of the phonemes, categorizes speech segments into four categories CC, CV, VC, and VV (C: a consonant, V: a vowel), and performs segment recognition in each category* (in the end of that paragraph). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Rosenberg to the device and/or method of Maddox because defining units larger than phones will be easier to work with, segment and label by virtue of containing greater variations and context effects.

Maddox, Komori et al^{'975 & '396}, & Tominaga

18. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori et al^{'975} and further in view of Komori et al^{'396} and further in view of Tominaga (U.S. Patent 5,311,429 A).

19. Regarding claims 3 and 10; the claims are set forth with the same limits as claims 1 and 8, respectively. Maddox does not mention registering segments.

The speech recognition method of Komori et al^{'396} (column 4 lines 24-30) reads on the feature of *determining a speech segment to be registered in a segment dictionary in accordance with a segment recognition result of that segment recognition.*

The *maintenance support method and apparatus for natural language processing system* of Tominaga (column 11 lines 19-36) reads on the feature that *checks if a speech segment pattern which matches a speech segment that is not successfully recognized by that segment recognition means, and registers that speech segment in the segment dictionary if the corresponding speech segment pattern is found.*

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Komori et al & Tominaga to the device/method of Maddox so as to avoid duplicate entries.

Maddox, Komori et al^{'975 & '396}, & Richardson et al

20. Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori et al^{'975} and further in view of Komori et al^{'396} and further in view of Richardson et al (U.S. Patent 5,926,784 A).

21. Regarding claims 7 and 14; the claims are set forth with the same limits as claims 6 and 13, respectively. Maddox does not mention registering segments.

In *natural language parsing using Podding*, Richardson et al (column 1 lines 21-25) reads on the feature that *registers, in the segment dictionary, speech segments having upper values (claims 39 and 41) obtained by normalizing the likelihoods by durations of the speech segments or likelihoods having the values not less than a predetermined value.*

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Richardson et al to the device/method of Maddox so as to further improve the efficiency with probabilities assigned to the syntax rules.

Maddox, Komori et al^{'975 & '396}, Tominaga, Fukada et al, Huang et al^{'193}

22. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori et al^{'975} and further in view of Komori et al^{'396} and further in view of Tominaga and further in view of Fukada et al (U.S. Patent 5,845,047 A) and further in view of Huang et al^{'193} (U.S. Patent 5,913,193 A)

23. Regarding claim 16, the claim is set forth with the same limits as claim 8. The feature of *a segment dictionary in which speech segments are registered* is cited in *claim 8* and the rejections are applied to this claim for the same reasons.

Where Maddox is silent on the subject of *language analysis*, Tominaga (column 3 lines 46-56) reads on the feature *for performing language analysis of input text data.*

Where Maddox is silent on the subject of *prosody*, Fukada et al (column 6 line 59) reads on the feature of *generating prosody on the basis of an analysis result of that language analysis means* and the *runtime acoustic unit selection for speech synthesis* of Huang et al^{'193} (column 3 lines 1-4) reads on the feature that *search that segment dictionary on the basis of the prosody generated by that prosody generation means to select corresponding speech segments* and, with (column 1 line 66) reads on *modifying and concatenating the speech segments selected by that speech segment selection means* and (132 in figure 5) for *reproducing speech on the basis of the result modified by that speech segment modification/concatenation means*.

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Tominaga, Fukada et al & Huang et al^{'193} to the device/method of Maddox so as to improve the quality of synthetic speech by considering additional attributes of language.

Maddox, Komori et al^{'975 & '396}, & Huang et al^{'193}

24. Claims 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori et al^{'975} and further in view of Komori et al^{'396} and further in view of Huang et al^{'193} (U.S. Patent 5,913,193 A).

25. Regarding claims 19 and 22; the claims are set forth with the same limits as claims 17 and 20, respectively. Maddox is silent as to *speech synthesis*. Huang et al^{'193} (36 in figure 1) reads on the feature of *producing synthetic speech using the*

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segment dictionary (22→→36 in figure 1) ... which would have made it obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Huang et al to the device/method of Maddox so as to generate natural-sounding speech.

Allowable Subject Matter

26. Claims 4-5 and 11-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

27. The following is a statement of reasons for the indication of allowable subject matter:

- The present invention is directed to building and maintaining speech segment dictionaries.
- Claims 4 and 11 identify the uniquely distinct feature that "*registers a speech segment in the segment dictionary when the number of speech segments recognized is not less than a predetermined value.*"

The closest prior art, Yokota et al, discloses *registering recognized speech segments* but fails to anticipate or render the above underlined limitations obvious.

- Claims 5 and 12 depend on claims that were found to be allowable and so would they be allowed as a consequence.

28. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Nakagawa et al ("A Method For Continuous Speech Segmentation Using HMM", 9th International Conference on Pattern Recognition, November 1988) statistical segmentation using a hidden Markov model (HMM) of vowels & consonants.
- Yokota et al (U.S. Patent 6,385,339 B1) collaborative learning system and pattern recognition method.
- Tominaga (U.S. Patent 5,311,429 A) maintenance support method and apparatus for natural language processing system.
- Huang et al^{'972} (U.S. Patent 5,905,972 A) prosodic databases holding fundamental frequency templates for use in speech synthesis.

29. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Daniel A. Nolan at telephone (703) 305-1368 whose normal business hours are Mon, Tue, Thu & Fri, from 7 AM to 5 PM.

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If attempts to contact the examiner by telephone are unsuccessful, supervisor Richemond Dorvil can be reached at (703)305-9645.

The fax phone number for Technology Center 2600 is (703)872-9314. Label informal and draft communications as "DRAFT" or "PROPOSED", & designate formal communications as "EXPEDITED PROCEDURE". Formal response to this action may be faxed according to the above instructions,

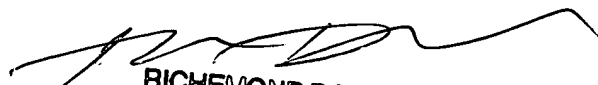
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or hand-delivered to: Crystal Park 2,
2121 Crystal Drive, Arlington, VA,
Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Technology Center 2600 Customer Service Office at telephone number (703) 306-0377.

Daniel A. Nolan
Examiner
Art Unit 2654

DAN/d
October 6, 2003


RICHEMOND DORVIL
SUPERVISORY PATENT EXAMINER